Correlation between deep learning based predicted ages from structural brain image and time-of-flight cerebral angiography

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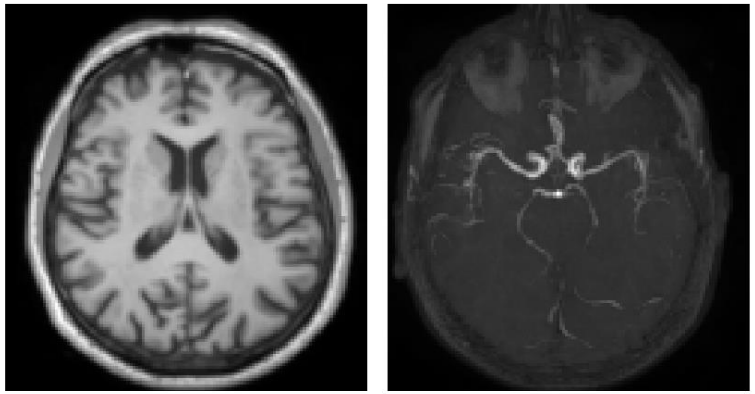
INTRODUTION

- Age-related changes were observed in both structural brain image and cerebral angiography.
- However, the relationship between the predicted ages from two different images has not yet been analyzed.

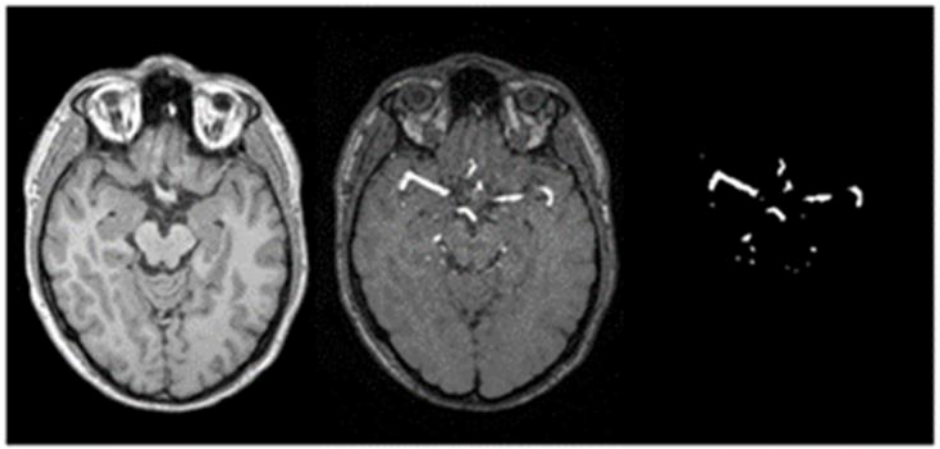
Young

Old



Objective

- So, we investigate the correlation between the predicted ages from the structural image and the angiography.



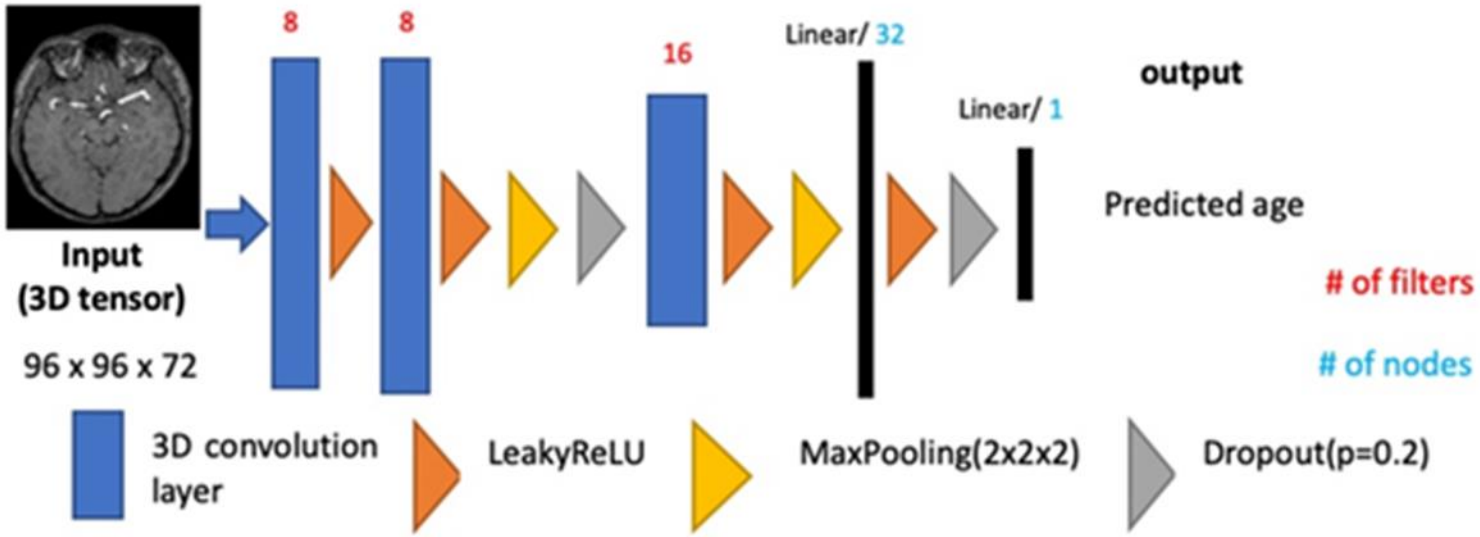
Deep learning architecture

Predicted Age

MATERIAL

- IXI dataset (brain-development.org/ixi-dataset) including 460 subjects with T1 and TOF.
- 410 subjects for training the model
- 50 subjects for validation and comparison between the models.
- T1(raw), TOF(raw) and TOF(vessel) are used as inputs for the identical model architecture to predict age respectively.
- Correlation coefficients between three models and MAEs(mean absolute errors) between predicted age and actual age were calculated for validation set.

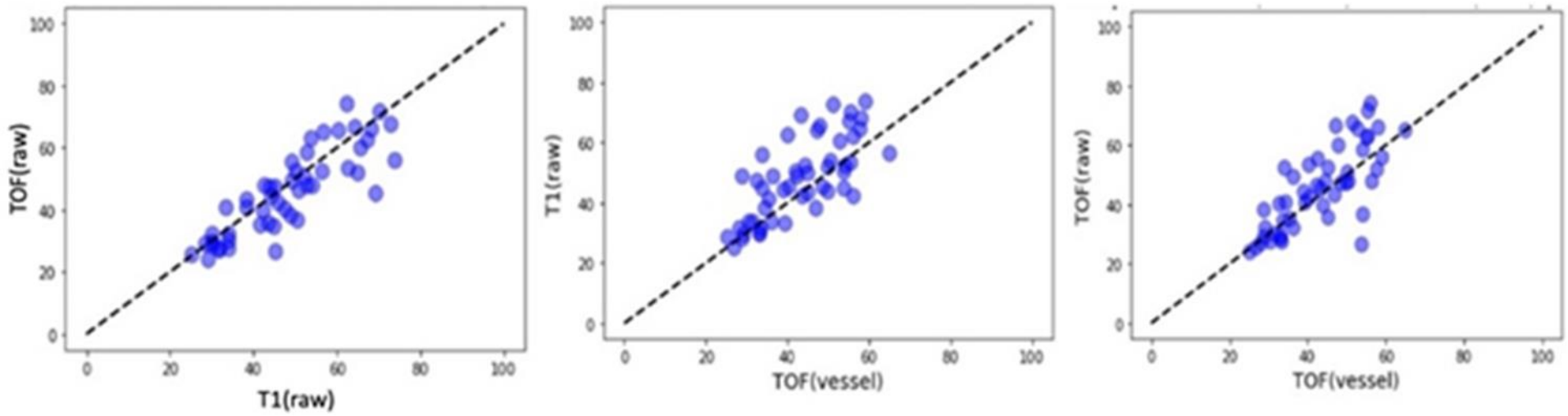
METHODS



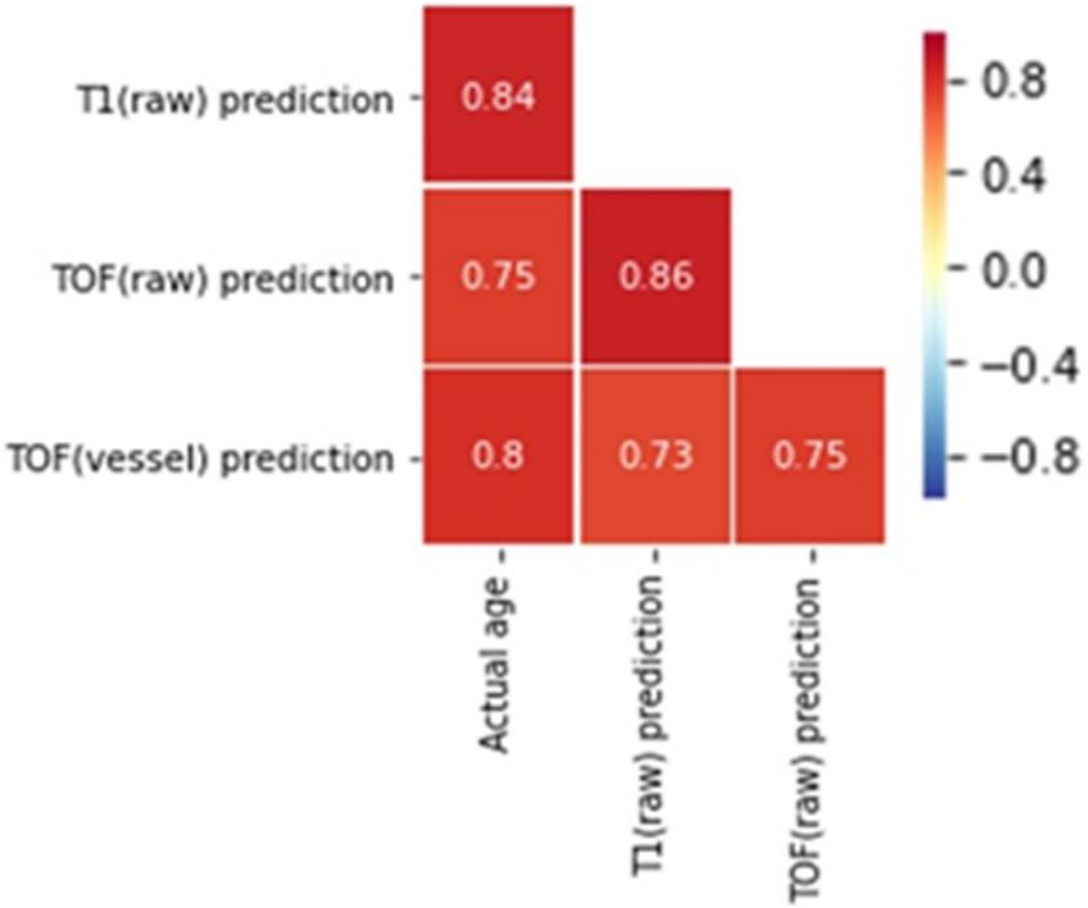
- Three models were trained: T1(raw), TOF(raw), TOF(vessel only)
- Input image size : 96x96x72 in each model.
- Output is the predicted age.
- Training set: N = 410, validation set: N = 50.
- For evaluation, MAE and correlation coefficients were calculated.

RESULTS

- The MAEs for validation set were 7.09 for T1(raw), 8.42 for TOF(raw), and 8.99 for TOF(vessel), respectively.



RESULTS



- The image is the correlation coefficient heatmap between models.

CONCLUSION

Compared to the predicted ages from T1, the predicted ages showed slightly lower correlations when using vessel segmented TOF. Further validation should be performed to specify the clinical utility of each model.